

SOV/58-59-8-17416

Translated from: Referativnyy Zhurnal Fizika, 1959, Nr 8, p 67 (USSR)

AUTHORS: Val'ter, A.K., Klyucharev, A.P., Krivets, G.Ya., Samsonov, V.M.

TITLE: Cross Sections for $\text{Be}^9 (\text{He}^3, p) \text{B}^{11*}$ Reactions at 1.5 Mev Energy

PERIODICAL: Uch. zap. Khar'kovsk un-t, 1958, Vol 98, Tr. fiz. otd. fiz.-matem. fak., Nr 7, pp 159-161

ABSTRACT: In order to determine the cross sections for $\text{Be}^9 (\text{He}^3, p) \text{B}^{11*}$ reactions, which correspond to the excitation levels of 7.3, 5.0 and 4.4 Mev of the B^{11} nucleus, a thin beryllium target was bombarded with He^3 ions, accelerated by means of an electrostatic generator up to 1.5 Mev. The charged particles flying out at an angle of 120° , were registered on photographic plates having an emulsion 200μ thick. The quantity of He^3 ions was determined from the intensity of current in the target, which was measured with an integrator. The total cross sections for the three groups of protons were estimated from the resulting magnitudes of the differential cross sections at an angle of 120° and of the angular distributions of these groups of protons, corresponding to the nuclear

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Cross Sections for $\text{Be}^9 (\text{He}^3, p) \text{B}^{11*}$ Reactions at 1.5 Mev Energy

levels of 7.3, 5.0 and 4.4 Mev. The following values (in mbarn) were obtained in the result: (1.4 ± 0.7) , (0.5 ± 0.25) and (1.0 ± 0.5) respectively.

V.I. Man'ko

Card 2/2

SOV/58-59-9-19798

Translation from: Referativnyy Zhurnal Fizika, 1959, Nr 9, p 55 (USSR)

AUTHORS:

Deyneko, A.S., Taranov, A.Ya., Val'ter, A.K.

TITLE:

The Determination of Absolute Cross Sections for $B^{10}(p, \gamma)$ and $B^{10}(d, n)$ Reactions

PERIODICAL:

Uch. zap. Khar'kovsk. un-t, 1958, Vol 98, Tr. Fiz. otd. fiz.-matem. fak., Vol 7, pp 163 - 170

ABSTRACT:

In order to obtain more precise information concerning the levels of the C^{11} nucleus, the authors, through the positron activity of C^{11} nuclei, studied the absolute effective cross section for a $B^{10}(p, \gamma)$ reaction in the 300 to 1,500 KeV proton energy range and for a $B^{10}(d, n)$ reaction in the 100 to 400 KeV deuteron energy range. A special end-window counter served as positron detector. The targets were bombarded with a proton beam from an electrostatic generator, and it proved possible to turn the target faces toward the counter immediately after irradiation. The measured value of the half-life of C^{11} was equal to 20.6 ± 0.1 min. The authors give the energy dependences of the cross sections for $B^{10}(p, \gamma)$ and $B^{10}(d, n)$ reactions. It can be seen from the excitation curve for

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The Determination of Absolute Cross Sections for $B^{10}(p, \gamma)$ and $B^{10}(d, n)$ Reactions

the $B^{10}(p, \gamma)$ reaction that extensive resonance exists at $E_p = 1.176$ MeV. Other resonances were not observed in the investigated range. Accuracy in cross-section measurement amounts to 20% at energies of 300 to 600 KeV and attains 10% in the region of resonance. When $E_d = 230$ KeV, there is a maximum in the cross section for the $B^{10}(d, n)$ reaction. The absolute value of the effective cross section at resonance amounts to $2.68 \cdot 10^{-28} \text{ cm}^2$ with an accuracy approaching $\pm 10\%$. On the basis of these data, the value of the resonance-level energy of C^{11} was computed to be 25.345 MeV.

V.I. Man'ko

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VAL'TER, A.K.

9(314) p. 2

PHASE I BOOK EXPLOITATION

80V/2746

Akademiya nauk USSR. Fiziko-tekhnicheskiy institut

Elektrostaticheskiye generatory; sbornik statey (Electrostatic Generators; Collection of Articles) Moscow, Atomizdat, 1959. 255 p. 4,100 copies printed.

Ed. (Title page): A. K. Val'ter, Member, Academy of Sciences, USSR; Ed. (Inside book): Z. D. Andreyenko; Tech. Ed.: N. A. Vlasova.

PURPOSE: This collection of articles may be useful to scientists and engineers working with high-voltage electrostatic generators.

COVERAGE: The authors discuss the construction and operation of a number of electrostatic generators developed in the USSR and describe methods of generating negative hydrogen ~~ions~~. They discuss the operation of accelerating tubes and present methods of stabilizing accelerator voltages. No personalities are mentioned. References appear at the end of some articles.

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Electrostatic Generators (Cont.)

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TABLE OF CONTENTS:

Val'ter, A. K. Areas of Use and General Principles of Construction of High-voltage Electrostatic Generators	3
The author presents a general discussion of various types of construction of high-voltage electrostatic generators and describes their fields of use. There are no references.	
Koval', A. G., L. I. Krupnik, A. D. Timofeyev and Ya. M. Fogel'. Problem of Producing a Beam of Negative Hydrogen Ions by Overcharging Positive Ions in a Cathode Channel of a High-frequency Source	15
The authors discuss a negative hydrogen-ion source based on the production of a negative ion beam by overcharging positive ions in a gas flowing through a cathode channel of a high-frequency source. They also derive expressions for determining amount of negative hydrogen ions in that beam. There are 11 references: 6 Soviet, 4 English and 1 German.	
Tsygikalo, A. A. Testing of Accelerating Tubes of a 4 Mev Electrostatic Accelerator Developed by FTI AN UkrSSR	23

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Electrostatic Generators (Cont.)

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The author discusses the operation of a voltage stabilization system for a high-current accelerator. The system was developed and tested in the laboratory of FTI AN UkrSSR and it may be used in accelerators using an electrostatic generator and a multiplier circuit. There are no references.

Serbinov, A. N. High-frequency Sources for Electrostatic Generators

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The author presents the results of study, conducted by FTI AN UkrSSR in 1953-1955, of factors affecting the ring discharge in hydrogen in a transverse magnetic field and those affecting the percentage of ions in a 10-50-mc frequency range and initial pressure in the discharge chamber of 1 through 4×10^{-2} mmHg. He also discusses the construction and operation of a high-frequency ion source. There are 3 references: 2 English and 1 German.

Belyayev, V. Kh., A. K. Val'ter, K. K. Chernyavskiy and S. P. Tsytko.
High-voltage Vertical-Horizontal Electrostatic Generator

90

The authors discuss the construction and operation of an electrostatic generator with a cross-shaped steel boiler and two horizontal tubes and describe the advantages of such a design over horizontal

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Electrostatic Generators (Cont.)

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and vertical types of generators. There are 23 references: 8 Soviet, 13 English, 1 French and 1 Danish.

Osetinskiy, G. M. Magnetic Analyzer as an Instrument for Measuring Voltages of an Electrostatic Generator

The author discusses the use of a magnetic analyzer for measuring voltages of an electrostatic generator. He briefly explains the construction of the analyzer and describes the procedure used in measurement. There are 3 references, all English.

99

Osetinskiy, G. M., and I. A. Chepurchenko. Voltage Stabilization of an Electrostatic Generator.

The authors discuss the construction and operation of a voltage stabilization circuit and its elements such as a differential amplifier and a corona triode and describe the method of experimentally determining the degree of stabilization. There are no references.

106

Fogel', Ya. M., A. M. Markus, V. T. Tolok and Ya. I. Shvarts. Ion Sources for Electrostatic Generators in a Compressed Gas

The authors discuss the requirements of ion sources for electrostatic

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Electrostatic Generators (Cont.)

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Pivovar, L. I. Accelerating Tube of an Electrostatic Generator

183

The author briefly discusses factors affecting electric strength of an accelerating tube and describes processes taking place on tube walls and intermediate electrodes. He also explains the effect of residual gases and vapors in a tube on its operation. There are 11 references: 3 Soviet, 7 English and 1 French.

Val'ter, A. K., A. Ya. Taranov, L. I. Pivovar, Ya. M. Fogel', V. Kh. Belyayev and S. P. Tsytko. 5-Mev Horizontal Overcharging Electrostatic Generator

193

The authors discuss the principle of operation and construction of a PG-5 type electrostatic generator and describe methods of ion acceleration and overcharging. They also explain the operation of an ion-beam focusing system and briefly discuss the stabilization and measurement of generator voltages. There are 4 references: 3 Soviet and 1 English.

Val'ter, A. K., and A. A. Tsygikalo. Experience Acquired in the Design, Testing and Operation of a 4-Mev Vertical Electrostatic Accelerator Developed by FTI AN UkrSSR

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Electrostatic Generators (Cont.)

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The authors discuss the construction and requirements of a 4-Mev vertical electrostatic accelerator developed by FTI AN UkrSSR and present the results of a study of insulating materials for the accelerator and the accelerating tube. They also discuss the results of testing of the accelerator and its components and present current and voltage characteristics. There are 12 references: 8 Soviet, 3 English and 1 French.

Malyshev, I. F., F. G. Zheleznikov and G. Ya. Roshal'. Experience Acquired in the Development of Industrial Types of Electrostatic Generators

224

The authors discuss the construction and operation of a EG-2.5 million-volt electrostatic generator and its components and present the results of testing. They also briefly describe the operation of a EG-5-1 type 4-5 million volt electrostatic generator developed by OKB in 1956. There are 9 references: 4 Soviet (including 1 translation) and 5 English.

AVAILABLE: Library of Congress

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JP/os
1-6-60

SOV/136-59-5-3/21

AUTHORS: Plaksin, I.N., Corresponding Member of the AN SSSR (AS USSR), Val'ter, A.K., Academician AN Ukr SSR (AS Ukr SSR), and Gol'din, M.L., Engineer.

TITLE: Development of Methods for Measuring Pulp Density (Razvitiye metodov izmereniya plotnosti pul'py)

PERIODICAL: Tsvetnyye metally, 1959, Nr 5, pp 16-22 (USSR)

ABSTRACT: Four main methods exist for pulp-density measurement: pyknometric (Fig 1), float, hydrostatic (Fig 2 shows an advantageous piezometric variant), and radioactive. Hydrostatic methods are in wide and successful use, e.g. at the Balkhashskaya (Balkhash) obogatitel'naya fabrika (beneficiation works). The first three methods have a number of disadvantages (including inapplicability to high-density pulps) absent from radioactive methods (based on the relation between gamma radiation absorption and density). An important development in radioactive methods is the use of scintillation counters, and a great improvement for this type of instrument was reported recently by Reiffel and Humphreys (Ref 20) (Fig 3). Two schemes for a radioactive-type density meter were reported at the conference of radioactive and stable

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SOV/136-59-5-3/21

Development of Methods for Measuring Pulp Density

isotopes and their uses, held in Moscow in April 1957. One of these, (Ref 9) shown in Fig 4, uses two sources, caused to vibrate in opposite phases by electromagnetic vibrators. The other (Ref 10) has one source on a disc rotated by a synchronous motor (Fig 5); it has the advantage of using only one source. Although scintillation counters enable low-activity sources to be used they involve complicated apparatus. Considerable simplification is possible by the use of ionization chambers. A compensating two-chamber method (Ref 11) is shown in Fig 6; this further reduces instrument errors and has the advantage of practically unlimited detector service life. It is the scheme favoured by the authors.

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SOV/136-59-5-3/21

Development of Methods for Measuring Pulp Density

There are 6 figures and 24 references, 15 of which are Soviet and 9 English.

ASSOCIATION: IGD AN SSSR, Fiziko-tekhnicheskii institut (Physical-technical institute) of the AS Ukr SSR, and Khar'kovskiy zavod KIP (KIP works in Khar'kov)

Card 3/3

VAL'TER, A.K.; ZALYUBOVSKIY, I.I. [Zaliubovs'kyi, I.I.]; KLYUCHAREV, A.P.
[Kliuchariev, O.P.]; LUTSIK, V.P. [Lutsyk, V.P.]

Energy levels of a Zn^{65} nucleus [with summary in English]. Ukr.
fiz. zhur. 4 no.1:46-51 Ja-F '59. (MIRA 12:6)

1. Fiziko-tehnicheskij institut AN USSR i Khar'kovskiy gosudarstvennyy universitet.
(Zinc--Isotopes) (Nuclear shell theory)

VAL'TER, A.K.; ZALYUBOVSKIY, I.I. [Zaliubovs'kyi, I.I.]; KRIVETS, G.Ye.
[Kryvets', H.IU.]; LUTSIK, V.P. [Lutsyk, V.P.]

Isomeric states of odd-odd nuclei from the viewpoint of a
collective model. Ukr.fiz.zhur. 4 no.6:689-696 N-D '59.
(MIRA 14:10)

1. Fiziko-tekhnicheskiy institut AN USSR.
(Isomerism) (Nuclear models)

VAL'TER, A.K.; ZALYUBOVSKIY, I.I. [Zaliubovs'kyi, I.I.]; LUTSIK, V.P.
[Intsyk, V.P.]

Applying a generalized nuclear model for describing the ground
states of nuclei of medium atomic weight. Ukr.fiz.zhur. 4
no.6:697-707 N-D '89. (MIRA 14:10)

1. Fiziko-tehnicheskii institut AN USSR i Khar'kovskiy
gosudarstvennyy universitet.
(Nuclear models)

SOV/48-23-2-12/20

21(7)
 AUTHORS: Val'ter, A. K., Zalyubovskiy, I. I., Klyucharev, A. P.,
 Krivets, G. Ye., Lutsik, V. A.

TITLE: On the Excitation States of the Nuclei Ga^{67} and Ga^{68}
 (O vozbuzhdennykh sostoyaniyakh yader Ga^{67} i Ga^{68})

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1959,
 Vol 23, Nr 2, pp 225-227 (USSR)

ABSTRACT: For the study of the lower energy levels Gd^{67} and Gd^{68} the
 authors investigated the γ radiation which occurs in the
 reactions $Zn^{66}(p,\gamma)Ga^{67}$, $Zn^{67}(p,n\gamma)Ga^{67}$ and $Zn^{67}(p,\gamma)Ga^{68}$.
 The zinc targets used were enriched with Zn^{66} and Zn^{67} . The
 γ lines determined during proton irradiation of the targets
 are listed (representation of the spectra in figures 1 and 2).
 The lines 170, 358, 850, and 510 keV are caused by re-
 actions of the types $Zn^{66}(p,\gamma)Ga^{67}$, $Zn^{67}(p,n\gamma)Ga^{67}$. The $(p,n\gamma)$
 reaction corresponds to the transition from the secondary
 excitation state into the basic state; it is a threshold re-

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On the Excitation States of the Nuclei Ca^{67} and Ca^{68}

action. According to these data, a scheme of the lower energy levels of Ca^{67} is given in figure 4. Because of the difficulties of investigating reaction $\text{Zn}^{67}(\text{p}, \gamma)\text{Ca}^{68}$ the authors measured only the upper limit of the γ spectrum in the Ca^{68} decay. It is found at γ quantum energies of 2.05 ± 0.1 Mev. There are 4 figures and 4 references, 3 of which are Soviet.

ASSOCIATION: Fiziko-tekhnicheskiy institut Akademii nauk USSR, Khar'kovskiy gos. universitet im. A. M. Gor'kogo
(Physico-technical Institute of the Academy of Sciences,
UkrSSR, Khar'kov State University imeni A. M. Gor'kiy)

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21(7)

SOV/48-23-2-13/20

AUTHORS:

Val'ter, A. K., Gonchar, V. Yu., L'vov, A. N., Tsytko, S. P.

TITLE:

Investigation of γ Rays Caused by Proton Bombardment of an Ne^{20} -containing Target (Issledovaniye γ -luchey, vznikayushchikh pri bombardirovke protonami misheni, sodержashchey Ne^{20})

PERIODICAL:

Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1959, Vol 23, Nr 2, pp 228-234 (USSR)

ABSTRACT:

In a short introduction a decay scheme of the lower levels of the nuclei Ne^{21} and Na^{21} is given according to data contained in references 1-3 and 4-6, 7. In the present paper the characteristics of the level 3.57 Mev in the Na^{21} nucleus were investigated in detail in the reaction $\text{Ne}^{20}(p,\gamma)\text{Na}^{21}$. The authors measured the radiation yield in dependence on the energy of the bombarding particles (Fig 1). 10 resonances were found. The energies and experimental width of these resonances are given in table 1. Furthermore, the authors studied the β activity of the same target with energies corresponding to the resonance, as well as the γ spectrum of all 10 resonance energies. All measurement results are listed in table 1. It follows from the evaluation of all data obtained that the

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SOV/48-23-2-15/20

Investigation of γ Rays Caused by Proton Bombardment of an
Ne²⁰-containing Target

resonance energy with the proton energy 1175 kev corresponds to the reaction $\text{Ne}^{20}(\text{p}, \gamma)\text{Na}^{21}$. The energy of the corresponding γ -radiation amounts to 3.60 Mev. According to the calculation of mass defect with the proton energy 1175 kev the same value 3.58 Mev is determined. Accurate investigations have shown that this 3.60 Mev γ line corresponds to the transition into the ground state. The angular distribution of dipole and quadrupole γ transitions was calculated and compared to values obtained by experiments. In addition, spin and parity of the 3.58 Mev level of Na²¹ were determined to be $5/2^+$. There occurs a dipole transition $5/2^+ \rightarrow 3/2^+$ (Table 5). The authors thank M. I. Guseva for production of the Ne²⁰ target and Ye. V. Inopin for discussion of the results obtained. There are 4 figures, 5 tables, and 17 references, 4 of which are Soviet.

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SOV/48-23-2-13/20

Investigation of γ Rays Caused by Proton Bombardment of an
Ne²⁰-containing Target

ASSOCIATION: Fiziko-tekhnicheskiy institut Akademii nauk USSR
(Physicotechnical Institute of the Academy of Sciences, UkrSSR)

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24(5), 21(7)
AUTHORS:

SOV/48-23-7-11/31
Val'ter, A. K., Gonchar, V. Yu., L'vov, A. N., Tsytko, S. P.

TITLE:

The Investigation of Low-lying Levels of the Isotope Cl^{33} by Means of the Reaction $\text{S}^{32}(\text{p}, \gamma) \text{Cl}^{33}$
(Issledovaniye nizkolezhashchikh urovney Cl^{33} pri pomoshchi reaktsii $\text{S}^{32}(\text{p}, \gamma) \text{Cl}^{33}$)

PERIODICAL:

Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1959, Vol 23, Nr 7, pp 835-838 (USSR)

ABSTRACT:

The introduction indicates some papers on the lower levels of the Cl^{33} -nuclei, pointing out the paper by Meyerhof and Lindstrom (Ref 3) in which the multiple β -decay on the 2.9 Mev-level is attributed to a positive parity. To check this assumption, the authors carried out the experiments described in this paper. The electrostatic precision generator of 4 Mev of the FTI AS UkrSSR was used for this purpose. In the measurement of the γ -yield, resonances were found at 583 and 590 kev, as well as a half-life of 2.3 sec, which agrees with the known data. Further, the scheme of γ -transitions shown in figure 2 was established by the authors by means of the

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The Investigation of Low-lying Levels of the
Isotope Cl^{33} by Means of the Reaction $\text{S}^{32}(\text{p}, \gamma) \text{Cl}^{33}$

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γ -spectrum. The angular distribution of the γ -rays in the reaction $\text{S}^{32}(\text{p}, \gamma) \text{Cl}^{33}$ was measured, and the results are shown in table 1 and figures 3 and 4. From these results, conclusions concerning the spin and the character of transitions are made, and it is shown that the spin and the parity of the 2.850 Mev-level is equal to $5/2^+$. With the level scheme shown in figure 2, conclusions are made concerning the spin, parity and energy of the next level. Finally, the authors thank M. I. Gusev for the preparation of the S^{32} -target, and Ye. V. Inopin for his interest in the work, Yu. P. Antuf'yev and Ye. G. Kopanets for the execution of the measurements, as well as A. A. Tsygikalo and Yu. A. Kharchenko who secured the work at the generator. There are 4 figures, 1 table, and 9 references, 4 of which are Soviet.

ASSOCIATION: Fiziko-tehnicheskii institut Akademii nauk USSR (Physico-technical Institute of the Academy of Sciences, UkrSSR)

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24(5), 21(7)

SOV/48-23-7-12/31

AUTHORS:

Val'ter, A. K., Deyneko, A. S., Malakhov, I. Ya., Sorokin, P. V.,
Taranov, A. Ya.

TITLE:

The Elastic Scattering and the Radiation Capture of Protons by
 N^{14} -Nuclei (Uprogoye rasseyaniye i radiatsionnyy zakhvat
protonov yadrami N^{14})

PERIODICAL:

Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1959,
Vol 23, Nr 7, pp 839-845 (USSR)

ABSTRACT:

It is pointed out in the introduction that the investigations of
the elastic scattering of the protons by N^{14} -nuclei were carried
out by studying the levels of the O^{15} -nuclei, and a number of
papers (Refs 1-7) are pointed out in this connection. In another
paper (Ref 8), the reaction $N^{14}(p, \gamma)$ was investigated, and the
results of these papers are shown in diagrams (Figs 2 and 3).
In the present paper, the elastic scattering cross section is
investigated in the energy range of 1.7 - 3.5 Mev. The measuring
instrument used in these investigations is shown in figure 1,
and the proton beam was generated by the electrostatic generator

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The Elastic Scattering
and the Radiation Capture of Protons by N^{14} -Nuclei

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of the FTI AS UkrSSR. The elastic scattering cross section of the protons on N^{14} -nuclei was measured under the angles 54, 90, 141 and 154°, and the results are shown in diagrams (Figs 2-6). The curves $\sigma(E_p)$ show six narrow resonances and one wide resonance at 2.4 Mev. In order to determine the width of the levels, the value of the resonance energy was accurately determined, it was investigated how much the proton beam is monoenergetic, and the reaction $N^{14}(p, \gamma)$ was studied. An experimental width of resonance of 7.5 kev was measured. The relative γ -yield was investigated in the resonance range of 1.8, 2.35 and 2.48 Mev, and the results are shown in 2 diagrams (Figs 7 and 8). By comparing the widths of the resonances thus obtained with the corresponding values for the resonance in the elastic scattering cross section, it becomes clear that the energetic scattering of the protons does practically not depend on the energy, and that the latter amounts to about ± 8 kev. This determines the widths of the levels in the elastic scattering cross section at 17 and 40 kev, respectively. The levels of

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The Elastic Scattering
and the Radiation Capture of Protons by N^{14} -Nuclei

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the O^{15} -nuclei are compiled in table 2, and it is ascertained that the results obtained are in good agreement with those obtained by other authors. The authors thank M. I. Gusev for the preparation of the N^{14} -target by the electromagnetic separator, and A. A. Tsygikalo and Yu. A. Kharchenko and the staff for the operation of the electrostatic generator. There are 8 figures, 2 tables, and 10 references, 1 of which is Soviet.

ASSOCIATION: Fiziko-tekhnicheskiy institut Akademii nauk USSR (Physico-technical Institute of the Academy of Sciences, UkrSSR)

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24(5), 21(7)
AUTHORS:

SOV/48-23-7-13/31

Val'ter, A. K., Malakhov, I. Ya., Sorokin, P. V., Taranov, A. Ya.

TITLE:

Elastic Scattering of the Protons by Ar^{40} -Nuclei
(Uprogoye rasseyaniye protonov yadrami Ar^{40})

PERIODICAL:

Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1959,
Vol 23, Nr 7, pp 846-848 (USSR)

ABSTRACT:

In the introduction, it is ascertained that the investigation of the elastic scattering of the protons by Ar^{40} -nuclei is carried out by studying the levels of the K^{41} -nuclei. A non-Russian paper is indicated (Ref 2) in which weak resonances were determined at the energies of 1.9 and 2.48 Mev; the values put forward are, however, considered inaccurate to obtain a survey of the spins and parities of the respective levels. The experiments described in the present paper were carried out with the same instrument as the experiments described in the previous paper of this issue. The elastic scattering cross section was recorded under the angles of 90, 125 and 150° in an energy range of 1.7 to 2.7 Mev. As the diagrams of

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Elastic Scattering of the Protons by Ar^{40} -Nuclei

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figures 1, 2 and 3 show, two weak resonances can be observed in the elastic scattering cross section at $E_p = 1.86$ and 2.45 Mev, and further a number of resonances at energies over 2.5 Mev. A comparison of the experimental data with the data computed, as well as a determination of the widths of the levels, are not possible. It is further ascertained that the reaction $\text{Ar}^{40}(p,n)\text{K}^{40}$ is only realized by protons with the orbital momentum $l = 3$ or $l = 5$. Finally, the distance of the levels in the K^{41} -nuclei is evaluated, and is indicated with 20 kev at an excitation energy of 10 Mev. There are 3 figures and 6 references, 2 of which are Soviet.

ASSOCIATION: Fiziko-tekhnicheskii institut Akademii nauk USSR
(Physico-technical Institute of the Academy of Sciences, UkrSSR)

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24(5), 21(7)

SOV/48-23-7-14/31

AUTHORS:

Val'ter, A. K., Zalyubovskiy, I. I., Klyucharey, V. A.,
Lutsik, V. A.

TITLE:

On the Excited States of Ga^{67} and Ga^{68}
(O vozbuzhdennykh sostoyaniyakh Ga^{67} i Ga^{68})

PERIODICAL:

Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1959,
Vol 23, Nr 7, pp 849-854 (USSR)

ABSTRACT:

In the present paper, the authors investigated the γ -rays
originating in the following reactions: $Zn^{66}(p, \gamma) Ga^{67}$,
 $Zn^{67}(p, n \gamma) Ga^{67}$, and $Zn^{67}(p, \gamma) Ga^{68}$. They used for this
purpose a scintillation γ -spectrometer. Also the decay of the
isotope Ga^{67} was investigated; the protons were accelerated
by means of the electrostatic generator of the FTI AS UkrSSR.
In table 1 and in three diagrams (Figs 1, 2 and 3), the
measured energies of the lines observed are represented and
compared with the results by other authors. It was found that in
the range of the γ -spectrum of 172-188 keV of Zn^{67} a shifting

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On the Excited States of Ga^{67} and Ga^{68}

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of the γ -peaks of the curves is caused by the irradiation with protons. This shifting is explained as follows: if the protons have an energy < 1.96 Mev, they do not excite the 172 kev-state of the isotope Ga^{67} , but a γ -radiation with an energy of 188 kev is observed caused by the reaction $Zn^{67}(p,\gamma)Ga^{68}$, and one with 182 kev caused by the reaction $Zn^{67}(p,p'\gamma)$. At an increase in the proton energy, the 172 kev- γ -radiation of Ga^{67} arises. Subsequently, the γ -radiation in the range of 120-240 kev at a proton energy > 2.1 Mev is attributed to the reaction $Zn^{67}(p,n)Ga^{67}$. The γ -spectrum of this interaction is complicated, and by a comparison with the reaction $Co^{59}(p,n)Ni^{59}$, which has no complicated structure in the range of the γ -spectrum of 120-240 kev, the half-width of the 163 kev- γ -line is computed, and it is concluded that the shifting of the peaks must not be observable. In investigating the reaction $Zn^{68}(p,n)Ga^{68}$, the excited state of Ga^{68} with the energy of

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On the Excited States of Ga⁶⁷ and Ga⁶⁸

SOV/48-23-7-14/31

342 kev had been detected before. The authors then make some deliberations on the levels of some reactions; a table of relative intensities of the γ -quanta is put forward for the decay Ga⁶⁷ \rightarrow Zn⁶⁷, and a level scheme of the isotopes Ga⁶⁷ and Ga⁶⁸ is established. There are 6 figures, 3 tables, and 8 references, 2 of which are Soviet.

ASSOCIATION: Fiziko-tekhnicheskiy institut Akademii nauk USSR (Physico-technical Institute of the Academy of Sciences, UkrSSR)
Khar'kovskiy gos. universitet im. A. M. Gor'kogo
(Khar'kov State University imeni A. M. Gor'kiy)

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PHASE I BOOK EXPLOITATION

80V/4768

Val'ter, Anton Karlovich

Vvedeniye v fiziku elementarnykh chastits (Introduction to the Physics of Elementary Particles) Khar'kov, Izd-vo Khar'kovskogo gos. univ-ta im. A.M. Gor'kogo, 1960. 261 p. Errata slip inserted. 10,000 copies printed.

Resp. Ed.: A.P. Klyucharev; Ed.: D.A. Vaynberg; Tech. Ed.: A.S. Trofimenko.

PURPOSE: This publication is intended as a textbook for students in the divisions of physics and mathematics in universities. It can also be used by teachers of physics in schools of secondary and higher education.

COVERAGE: This book presents basic facts established during the last two decades concerning the physics of elementary particles, and explains the physical laws governing elementary process occurring at very high energies. No personalities are mentioned. There are 10 references [in the Foreword]: 6 Russian, 3 English, and 1 French.

TABLE-OF-CONTENTS:

Foreword

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S/185/60/005/002/015/022
D274/D304

AUTHORS: Val'ter, A.K., Zalyubovs'kyi, I.I., Klyucharyev,
O.P., Pasichnyk, M.V., Pucherov, M.M. and Chyrko,
B.I.

TITLE: Elastic scattering of protons with an energy of
6.8 MeV by isotopes of chromium, nickel and copper

PERIODICAL: Ukrayins'kyi fizychnyy zhurnal, v. 5, no. 2, 1960,
270-272

TEXT: The angular distribution of elastically scattered protons by the isotopes: Cr⁵², Cr⁵³, Ni⁵⁸, Ni⁶⁰, Ni⁶², Cu⁶³, Cu⁶⁵ is investigated. Up to now it has not been easy to formulate a theoretical interpretation of the effects related to proton scattering; hence, the importance of gathering and systemizing relevant data. The protons with energy 6.8 ± 0.1 MeV were obtained on the cyclotron of the Physics Institute of the UkrSSR. The proton scattering was detected by a scintillation spectrometer. The measurements were conducted from 20° to 160°, at angle intervals of 5°. The investi-

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Elastic scattering of protons...

S/185/60/005/002/015/022
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gated mixtures contained at least 98% of the isotope, with the exception of Cr^{53} whose proportion was 95%; they were in the form of thin (3 - 4 μ) plates. The results of the investigations are given in 2 figures, where the angular distribution is plotted as the ratio of an experimental differential cross-section to the Rutherford cross-section. The results show a noticeable shift in the position of the maxima and minima of the angular distributions. It is noted that such a shift is observed for small differences in the mass number of the scatterer nucleus. Thus the distribution curve for Cu^{65} is shifted by 5° with respect to that of Cu^{63} . Such a result is in good agreement with data on proton scattering with 19.6 MeV energy. The form of the distribution curves for both Cu isotopes is entirely identical. The results for Cr isotopes are different. The differential cross-section in the region of large angles is considerably greater for Cr^{52} than for Cr^{53} . It is noted that it would be even much greater if the energy separation in the experiment would be higher. In the case of Ni isotopes, the distribution curve for Ni^{62} differs greatly from those for Ni^{60} . For Ni^{62} the cross section decreases considerably with increasing angles larger

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Elastic scattering of protons...

S/185/60/005/002/015/022
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than 120° . The angular distribution for Ni^{58} and Ni^{60} is in the main similar to that for natural isotope mixtures; this is not unexpected. The observed considerable difference in scattering by Ni isotopes, which may be related to various degree of absorption, is somewhat unexpected, though it does not contradict the results obtained by A.P. Klyucharev and N.Ya. Rutkevich (Ref. 3: ZhETF, 1, 1960). There are 2 figures and 5 references: 4 Soviet-bloc and 1 non-Soviet-bloc. The reference to the English-language publication reads as follows: M.K. Brussel, I.H. Williams, Phys. Rev., 114, 525, 1959.

ASSOCIATION: Instytut fizyky AN USSR (Physics Institute AS Ukr-SSR) Fizyko-tekhnichnyy instytut AN USSR (Physico-technical Institute AS UkrSSR) ✓

SUBMITTED: November 19, 1959

Card 3/3

21.7000

7814
SOV/89-3-3-10/3

AUTHORS: Val'ter, A. K., Gol'din, M. L.

TITLE: Humidity Determination of Free-Flowing Materials by Neutron Slowing-Down Method. Letter to the Editor

PERIODICAL: Atomnaya energiya, 1960, Vol 8, Nr 3, pp 248-250 (USSR)

ABSTRACT: Gravimetric, chemical, or electric methods can be used in humidity determination of free-flowing materials, but they are neither fast nor reliable. Putman noted during the 1955 Geneva Conference for Peaceful Uses of Atomic Energy that if neutron counting is used for humidity determination, the results should be independent from the presence of elements with $Z > 5$ and from density and mass of the absorber (except in the case of very strong neutron absorbers). The authors designed experiments using molding earth and measured the variable slow neutron flux by means of a scintillating detector. A

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Humidity Determination of Free-Flowing
Materials by Neutron Slowing-Down
Method. Letter to the Editor

78325

SOV/89-8-3-10/32

1-curie Po^{210} polonium-beryllium source supplied $2.5 \cdot 10^6$ neutrons/sec. Tests were performed by A. P. Krivchikov and N. V. Pavlenko. The earth was between two iron cylinders, and it was found more convenient to have the source and the detector completely surrounded by the material than to put the earth between them. For a fixed humidity the counting rate increased until the thickness of the earth reached 10 cm, and stayed afterwards constant, confirming conclusions of Putman. The counting rate of completely dry earth was equal to that of the background count of the empty device. The humid samples were prepared with an accuracy of better than 0.5 weight %. The results of three series of measurements are in Table A. Using interpolation formulas, the authors established an empirical relationship of the form:

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$$I = 1225 + 41W + 1210W^2 - 1,531W^3 + 01W^4$$

Humidity Determination of Free-Flowing
Materials by Neutron Slowing-Down
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Table A. Counting rate I versus humidity W.

w, weight %	0	3	6	9	12
I_0 , imp./s	1211 ± 10	1316 ± 6	1468 ± 27	1821 ± 33	2445 ± 100
I_2 , "	1232 ± 12	1312 ± 9	1529 ± 27	1751 ± 20	2425 ± 70
I_3 , "	1223 ± 10	1307 ± 7	1457 ± 36	1784 ± 34	2487 ± 119

Cand. Tech. Sc. T. V. Timofeyeva supplied advice.
There are 1 figure; 1 table; and 3 references, 2 Soviet,
and 1 a paper of unknown nationality, read at the
international Conference for Peaceful Uses of Atomic
Energy, Geneva, 1955.

SUBMITTED: May 25, 1959

Card 3/3

82736

S/089/60/009/002/007/015
B006/B056

21.5200
AUTHORS:

Val'ter, A. K., Gol'din, M. L., Slavin, V. I.

TITLE:

Approximate Calculation of the Mean Energy of Electrons
Knocked out by Gamma Rays in an Ionization Chamber 19

PERIODICAL:

Atomnaya energiya, 1960, Vol. 9, No. 2, pp. 135-136

TEXT: An ionization chamber is better suited than a phosphor for various technical purposes such as measuring the thickness and density of materials. The low efficiency of ionization chambers for gamma radiation may be increased by various means. Mostly, this is done by coating the inner surface of the chamber with lead and by using multi-layer high-voltage collector electrodes. As an exact calculation of the ionization current meets with considerable difficulties, an approximation method is suggested here, which is based upon the knowledge of the mean energy of the electrons knocked out by gamma quanta. For this purpose, the authors used published theoretical and experimental data concerning the gamma radiation of Co⁶⁰ and Cs¹³⁷. The geometry of the experiment theoretically dealt with in this paper is illustrated by a schematical drawing. The values obtained show that the

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Approximate Calculation of the Mean Energy of
Electrons Knocked out by Gamma Rays in an
Ionization Chamber

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B006/B056

method is suited for estimating ionization currents.

	Experimental	Calculated	Difference
Cs ¹³⁷	0.418 Mev	0.349 Mev	16.5%
Co ⁶⁰	0.702 Mev	0.798 Mev	13.7%



There are 1 figure, 1 table, and 9 references: 8 Soviet and 1 US.

SUBMITTED: February 26, 1960

Card 2/2

VAL'TER, A.K., akademik (Khar'kov)

Physics of high energy. Nauka i zhyttia 10 no.1:14-18
Ja '60. (MIRA 13:6)

1. AN USSR. (Nuclear physics)

07772

S/048/60/024/007/026/032/XX
B019/B056

24.6100
AUTHORS:

Antuf'yev, Yu. P., Val'ter, A. K., Gonchar, V. Yu.,
Kopanets, Ye. G., L'vov, A. N., and Tsytko, S. P.

TITLE:

An Investigation of the Levels of the Cl^{35} Nucleus

PERIODICAL:

Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1960,
Vol. 24, No. 7, pp. 877-883

TEXT: This paper was read at the 10th All-Union Conference on Nuclear Spectroscopy, which took place from January 19 to January 27, 1960 at Moscow. The author studied the levels and the quantum characteristics

of the Cl^{35} -nucleus by means of the reaction $\text{S}^{34}(\text{p}, \gamma)\text{Cl}^{35}$. The excitation function, the spectrum, and the angular distribution of the γ -rays were measured. The investigations of the S^{34} target were carried out by means of a monochromatic proton beam accelerated to 4 Mev in the electrostatic generator of the FTI AS UkrSSR. The γ -rays were recorded by means of a CsI(Tl) crystal. When studying the excitation function, γ -quanta with $E_{\gamma} > 1.5$ Mev were recorded. In the Table, the proton energies are given,

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An Investigation of the Levels of the Cl^{35}
Nucleus

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at which γ -resonance was observed; also given are the relative intensities of the resonance peaks and the energies of the excited Cl^{35} levels. For the purpose of studying the spectra and the angular distributions of the γ -rays, the authors used a monocrystal scintillation spectrometer. On the basis of the data obtained, the authors suggest the Cl^{35} transition scheme shown in Fig. 5. Resonances in the case of four proton energies (E_p) are discussed in detail. The resonance at $E_p = 848$ kev corresponds to the 7.196 Mev Cl^{35} level, for which a γ -transition to the 1.22 Mev level occurs with a probability of 95%, and a γ -transition to the ground state of Cl^{35} occurs with a probability of not more than 5%. For the 7.196 Mev level, $1/2^+$ is presumed. The resonance at $E_p = 890$ kev corresponds to the

7.236 Mev of the level of the Cl^{35} . The γ -spectrum indicates a transition from this level to the ground state. Also transitions to the 1.22-Mev level are possible. For the 7.236-Mev level, $5/2^+$ is assumed. Resonance at $E_p = 929$ kev corresponds to the 7.274-Mev level, from which transitions to the ground state (70%) and to the 1.22-Mev level (30%) occur. For this level, a spin of $1/2$ is assumed, but here a more exact investigation is necessary. The authors carried out preparatory measurements of the spectra

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An Investigation of the Levels of the Cl^{35}
Nucleus

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and of angular asymmetry of the γ -rays for the resonances at $E_\gamma = 881$,
1024, and 1214 keV. By a further investigation of the angular distri-
butions and correlation of the γ -cascade transitions, the problems arising
in this connection are expected to be cleared. The authors thank M. I.
Guseva for producing the S^{24} target, and A. A. Tsygikalo and Yu. A.
Kharchenko for work carried out on the accelerator. There are 5 figures,
1 table, and 8 references: 4 Soviet and 4 US.

ASSOCIATION: Khar'kovskiy fiziko-tehnicheskii institut Akademii nauk
USSR (Khar'kov Institute of Physics and Technology of the
Academy of Sciences, UkrSSR)

Card ^{3/3}

05593

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B019/B056

24.6600

AUTHORS:

Val'ter, A. K., Deyneka, A. S., Sorokin, P. V., and
Taranov, A. Ya.

TITLE:

The Elastic Scattering of Protons by Ne^{20} Nuclei
79 79

PERIODICAL:

Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1960,
Vol. 24, No. 7, pp. 884-886

TEXT: This paper was read at the 10th All-Union Conference on Nuclear Spectroscopy, which took place from January 19 to January 27, 1960 at Moscow. As a target, gaseous neon (90.5% Ne^{20}) at a pressure of 5 torr was used in the measurements described. The cross section was measured at angles of 55, 90, 125, 141, and 151° in the center-of-mass system. The proton energy was varied in the range of from 1.6 - 3.4 Mev. The heterogeneity of the radiation was ± 8 kev. From the results shown in Figs. 1 and 2, five well-marked resonances may be seen. In the first column of the Table, the proton energies, in the second column the energies of the corresponding Ne^{21} levels, in the third the level widths according to data by Heaberli (Ref. 2) and according to data obtained by the authors are

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The Elastic Scattering of Protons by Ne^{20}
Nuclei

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given. Furthermore, the spins and parities are given. The latter were obtained by a phase shift analysis. As shown by an investigation of the polarization of the protons scattered by Ne^{20} nuclei at an angle of 90° , the polarization in the energy range of from 1 - 1.8 Mev attains 70% (Fig. 3). There are 3 figures, 1 table, and 7 references: 3 Soviet, 3 US, and 1 Dutch.

Резонансные энергии протонов и характеристики уровней Na^{21}

Eр, MeV	Энергия уровней ядра Na^{21} , MeV	Ширина уровня Γ , keV		Спин и четность	Γ_p / Γ	Приведенная ширина γ , MeV см
		по нашим данным	по данным [2]			
1,81	4,18	121	180	$3/2^-$		$1,4 \cdot 10^{-13}$
1,96	4,32	17	6	$5/2^+$	0,25	$0,8 \cdot 10^{-13}$
2,15	4,50	27	17	$3/2^+$	0,84	$0,9 \cdot 10^{-13}$
2,69	5,02					
3,18	5,48	80	110	$1/2^+$		$0,2 \cdot 10^{-13}$

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S/048/60/024/007/008/011
B019/B060

AUTHORS: Val'ter, A. K., Antuf'yev, Yu. P., Gonchar, V. Yu.,
L'vov, A. N., Kopanets, Ye. G., Tsytko, S. P.

TITLE: A Study of the K^{41} Levels With the Aid of the $Ar^{40}(p,\gamma)K^{41}$
Reaction /9

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1960,
Vol. 24, No. 7, pp. 891-894

TEXT: This is the reproduction of a lecture delivered at the 10th All-
Union Conference on Nuclear Spectroscopy held in Moscow from January 19
to 27, 1960. The investigations described were carried out by using an
electrostatic precision generator serving for the proton acceleration. The
thin Ar^{40} target was prepared in an electromagnetic separator. The excita-
tion function of the reaction was measured by a scintillation counter
provided with a CsI(Tl) crystal, a proton current integrator serving for
measuring the proton beam hitting the target. Fig. 1 shows the excitation
function of the reaction under investigation in the proton energy range

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A Study of the K^{41} Levels With the Aid of the $S/048/60/024/007/008/011$
 $Ar^{40}(p,\gamma)K^{41}$ Reaction $B019/B060$

of 1085 - 1130 kev. Resonances were identified at 1092, 1107.5, 1114.5, and 1125 kev proton energies. The most intensive resonances occurred at 1092 kev and 1107.5 kev and their gamma spectrum was investigated. Fig. 2 is a graph depicting the soft and the hard part of the gamma spectrum of resonance at 1107.5 kev. These spectra are thoroughly discussed and the authors suggest a decay scheme of the excited K^{41} levels (Fig. 3), which also indicates the spins for some levels. The authors thank M. I. Guseva for having prepared the targets. There are 3 figures and 12 references: 6 Soviet, 5 US, and 1 Canadian.

ASSOCIATION: Fiziko-tekhnicheskiy institut Akademii nauk USSR
(Institute of Physics and Technology of the Academy of
Sciences UkrSSR)

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83575

S/056/60/038/005/008/050

B006/B070

24.6510

AUTHORS:

Val'ter, A. K., Zalyubovskiy, I. I., Klyucharev, A. P.,
Pasechnik, M. V., Pucherov, N. N., Chirko, V. I.

TITLE:

Angular Distributions of 6.8-Mev Protons Elastically
Scattered by Chromium-, Nickel-, and Copper Isotopes

PERIODICAL:

Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960,
Vol. 38, No. 5, pp. 1419-1423

TEXT: The authors have determined the angular distribution of 6.8-Mev protons elastically scattered by Cr^{52,53}, Ni^{58,60,62}, and Cu^{63,65}. (6.8±0.1)-Mev protons were obtained from the cyclotron of the Institut fiziki AN USSR (Institute of Physics of the AS UkrSSR). The scattered protons were recorded by a scintillation spectrometer which consisted of a CsI(Tl) crystal, a photomultiplier of the type ФЭУ-29 (FEU-29), and a 50-channel pulse-height analyzer of the type АИМА-1 (AIMA-1). Measurements were made between 20° and 160° every 5°, the angles being determined with an accuracy of 0.3°. Depending on the thickness of the target, the energy resolution of the scintillation spectrometer was 4-6%.

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83575

Angular Distributions of 6.8-Mev Protons
Elastically Scattered by Chromium-, Nickel-,
and Copper Isotopes

S/056/60/038/005/008/050
B006/B070

The energy spectrum of the scattered protons was taken for each angle of measurement. The differential scattering cross section was determined in the center-of-mass system. Free films of 3 - 5 μ thickness, enriched in the isotope to be studied to 93-98% served as targets. The compositions of the targets are given in a table. For a majority of the investigated nuclei, the energy resolution of the scintillation spectrometer was adequate to separate the group of inelastically scattered protons from that of elastically scattered protons. One of these energy spectra (Cr^{52}) is shown in Fig. 1. In this spectrum taken at 90° the first level (1.44 Mev) is distinctly marked; this group of protons can be well separated from the elastically scattered protons. The groups of protons related to the excitation of the lowest levels, 0.54 and 1.01 Mev, of the Cr^{53} nucleus can make a significant contribution to the elastic scattering, particularly for large scattering angles, because the high-energy resolution is inadequate. The angular distribution of elastically scattered protons for the two chromium isotopes and $E_p = 6.8$ Mev is shown in Fig. 2. The first excited states of $\text{Ni}^{58,60,62}$ are at 1.44, 1.33, and 1.17 Mev, respectively. The proton groups corresponding to these levels can be easily separated from the group of

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Angular Distributions of 6.8-Mev Protons
Elastically Scattered by Chromium-, Nickel-,
and Copper Isotopes

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elastically scattered protons. The angular distribution curves for Ni^{58} and Ni^{60} show analogous behavior, the curve for protons scattered from Ni^{62} deviates considerably from the former two (Fig. 3). The angular distributions and cross sections for the two copper isotopes show again analogous behavior; only, as for chromium, the curve for the heavier isotope is slightly (5°) shifted toward smaller angles. It is found that in order to obtain good agreement between theory and experiment, one must take into account, in the optical model, not only the spin-orbit interaction of the incident nucleon but also the effect of the shell structure of the nucleus on scattering. There are 4 figures, 1 table, and 12 references: 5 Soviet, 6 US, and 1 Japanese.

ASSOCIATION: Fiziko-tehnicheskii institut Akademii nauk Ukrainskoy SSR
(Institute of Physics and Technology of the Academy of
Sciences Ukrainskaya SSR)

SUBMITTED: November 17, 1959

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84425

S/056/60/039/004/043/048
B006/B056

24.6200

AUTHORS: Val'ter, A. K., Zalyubovskiy, I. I., Klyucharev, A. P.,
Lutsik, V. A.

TITLE: A New Method of Identifying γ -Radiations in the Reactions /9
(p,p' γ), (p, γ), and (p,n γ)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960,
Vol. 39, No. 4(10), pp. 1159 - 1161

TEXT: The investigation of nuclear levels by the bombardment of targets with low-energy protons is rendered difficult by not being able without any difficulty to decide whether the gamma radiation observed is due to a (p, γ), a (p,p' γ), or a (p,n γ) reaction. In the present "Letter to the Editor", the writers first discuss the factors influencing the relative frequency of the individual reactions. Thus, if this is possible from the viewpoint of energy, a gamma radiation accompanied by nucleons is more probable than a pure one, and the existence of the potential barrier, in turn, renders proton emission difficult, so that the reaction (p,n γ) is predominant; besides, the neutron emission probability near the

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A New Method of Identifying γ -Radiations in the Reactions $(p,p'\gamma)$, (p,γ) , and $(p,n\gamma)$

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(p,n) threshold grows quickly with the energy of the emitted neutrons, so that the $(p,p'\gamma)$ and (p,γ) reaction yields in certain proton energy ranges above the (p,n) threshold decrease quickly. By an investigation of the gamma yields of each of the observed lines as a function of proton energy in the (p,n) threshold region, it is possible to separate the gamma radiations resulting from the reactions $(p,p'\gamma)$ and (p,γ) of the investigated isotope from those of the admixtures, because it is improbable that the (p,n) thresholds are near to one another. An increase of proton energy beyond the (p,n) threshold causes an excitation of higher levels of the nucleus in the $(p,n\gamma)$ reaction, and each time after a level excitation threshold is exceeded, a decrease of the gamma-radiation intensity of the reactions $(p,p'\gamma)$ and (p,γ) may be observed. The (p,n) thresholds are well known for all stable isotopes, and deviate only little from one another for isotopes of the same element. In order to exclude changes in the gamma yield caused due to various proton capture probabilities on the individual levels of the compound nuclei, the target thickness must be chosen in a particular manner - for medium nuclei about 1μ . For the purpose of investigating nuclear levels by means of $(p,n\gamma)$ reactions, one proceeds in the opposite order by investigating the dependence of the gamma yield of

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A New Method of Identifying γ -Radiations in
the Reactions $(p,p'\gamma)$, (p,γ) , and $(p,n\gamma)$

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the reactions $(p,p'\gamma)$ and (p,γ) of the isotope in a large proton-energy range above the (p,n) threshold, thus determining the level excitation thresholds; hereafter, the threshold of the occurrence of gamma radiation from the $(p,n\gamma)$ reaction is determined - both must coincide if the gamma radiation investigated actually originates from the $(p,n\gamma)$ reaction, and corresponds to a transition from the investigated level to the ground state. In this method, the accuracy of level-energy determination is independent of the target thickness. As an example for a successful application of this method, the results obtained by investigating the reactions $\text{Co}^{59}(p,n)\text{Ni}^{59}$ and $\text{Cu}^{65}(p,n)\text{Zn}^{65}$ are given and discussed. A figure shows the excitation functions of some 465- and 1330-kev and 770- and 1015-kev lines, respectively. The target thicknesses were 1μ and 5μ , respectively. A number of numerical results are given. There are 1 figure and 2 references: 1 Soviet and 1 US.

ASSOCIATION: Fiziko-tehnicheskii institut Akademii nauk Ukrainskoy SSR
(Institute of Physics and Technology of the Academy of
Sciences Ukrainskaya SSR)

SUBMITTED: July 18, 1960

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24.6520
24.6810

21(8)

AUTHORS:

Rutkevich, N. Ya., Golovnya, V. Ya., Val'ter, A. K., Academician of the AS UkrSSR, Klyucharev, A. P.

68516
S/020/60/130/05/015/061

TITLE:

Angular Distribution of 5.45-Mev Protons Scattered Elastically by Nickel-, Copper-, and Cobalt Isotopes

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol 130, Nr 5, pp 1008-1011 (USSR)

ABSTRACT:

The present paper describes the determination of this angular distribution with initial proton energies of 5.45 Mev, which is below the potential threshold of the target nuclei by about 1.5 Mev. The protons accelerated to 5.45 Mev by a linac travel through a magnetic analyzer with a deflection of 24° , a system of collimating diaphragms, and incide upon a target made of a thin foil, which had been put in a vacuum chamber. The scattered protons were then recorded by photographic plates which were arranged at angles of from 20° to 160° with respect to the incident beam. Nuclear emulsions of the type K NIKFI with a layer thickness of 100μ were used. Figure 1 illustrates the geometrical arrangement of the experiment. Table 1 gives the

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Angular Distribution of 5.45-Mev Protons
Scattered Elastically by Nickel-, Copper-,
and Cobalt Isotopes

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B013/B014

composition and thickness of the metallic foils which served as targets. The electron flux was measured by means of a beam catcher with a current integrator. Figure 2 shows the energy distribution of protons scattered by Ni^{62} at 140° . The group of elastically scattered protons can be separated reliably from the nonelastically scattered protons. The half-width of the maximum corresponding to the elastically scattered protons is ± 100 kev. The non-monochromaticity of the primary protons is thus ± 100 kev at most. The first energy level is above 1 Mev for all even-even nickel isotopes. Co^{59} has its first level at 1.1 Mev and Cu^{65} at 0.77 Mev. The energy spectra of protons scattered by these nuclei indicated the existence of isolated elastic groups. In all cases, the elastically scattered protons could be separated reliably from the total spectrum. Figure 3A shows the angular distribution of protons elastically scattered by cobalt and the isotopes of nickel and copper. Measurements made by various methods (scintillation crystal

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Angular Distribution of 5.45-Mev Protons
Scattered Elastically by Nickel-, Copper-,
and Cobalt Isotopes

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B013/B014

with photomultiplier, photographic camera) yield consistent results. Figure 3B illustrates the angular distribution for a summation of the experimental data, for the three nickel isotopes under consideration, and for naturally-occurring nickel. Figure 4 shows the angular distribution of protons elastically scattered by the nuclei Ni^{58} , Ni^{60} , and Ni^{62} . The height of the maximum and the depth of the minimum are different, and the position of the minimum is markedly shifted toward smaller angles with increasing mass number of the scatterer. The angular distribution of protons scattered by copper and cobalt is qualitatively equal, but at large angles it differs noticeably from the scattering by nickel isotopes. The angular distribution of protons elastically scattered by Cu^{63} is qualitatively similar to that for Cu^{65} . The addition of two neutrons to the nucleus changes scattering as a function of the angle only to a small extent. This is also indicated by results obtained by the authors for nickel, which are, however, insufficient for general conclusions. It is therefore

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Angular Distribution of 5.45-Mev Protons
Scattered Elastically by Nickel-, Copper-,
and Cobalt Isotopes

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B013/B014

necessary to carry out further experiments on elastic scattering by various nuclei. There are 4 figures, 1 table, and 10 references, 4 of which are Soviet.

ASSOCIATION: Fiziko-tekhnicheskiy institut Akademii nauk USSR
(Institute of Physics and Technology of the Academy of
Sciences of the UkrSSR)

SUBMITTED: August 13, 1959

Card 4/4

S/120/61/000/001/004/062
E032/E114

AUTHORS: Val'ter, A.K., Klyucharev, A.P., and Skakun, N.A.

TITLE: Proton Polarimeters with Reduced Sensitivity to
Neutron and Gamma Backgrounds

PERIODICAL: Pribery i tekhnika eksperimenta, 1961, No.1, pp.20-22

TEXT: A description is given of two devices for measuring the polarization of protons at low and intermediate energies. Fig.1 shows a helium polarimeter used by the present authors. Protons whose polarization is to be measured enter from the left through the collimator 2. At the input to the collimator there is a thin aluminium foil 1 which separates the reaction chamber from the helium analyzer. After being scattered in the working volume of the polarimeter, the protons enter the proportional counter 11 through the Venetian blind collimator 4 which was first used by P.V. Sorokin (Ref.1). Slats of the latter collimator are made of copper foils 1 mm thick and set at an angle of 65° to the axis of the polarimeter. The width of this collimator is 20 mm and the distance between the slats is 6 mm. This design leads to an effective increase in the thickness of the Card 1/04 ✓

S/120/61/000/001/004/062
EO32/E114

Proton Polarimeters With Reduced Sensitivity to Neutron and Gamma Backgrounds

gas target and, consequently, in the number of counts. A further increase in the latter number is obtained by increasing the pressure of the helium gas to 10 atm. After passing through the proportional counter the protons enter the caesium iodide crystal (10 in Fig.1) ($104 \times 35 \times 1.5 \text{ mm}^3$) which is in the form of a mosaic made up of separate plates. The light guide 9 is made of perspex and the photomultiplier 8 is at an angle of 30° to the polarimeter axis. Pulses due to a given proton which are recorded by the proportional counter and the photomultiplier are fed into a coincidence circuit. In this way neutron and gamma ray backgrounds are practically excluded. The central photomultiplier 7 (FEU-29) is used to measure the energy of the protons entering the polarimeter and can also be used as a proton monitor. The absolute counting efficiency of the polarimeter for 18 MeV protons is about 10^{-5} . A major advantage of this type of polarimeter is the continuous recording of particles recorded to the left and to the right of the polarimeter axis. The second type of

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S/120/61/000/001/004/062
EO32/E114

Proton Polarimeters With Reduced Sensitivity to Neutron and Gamma Backgrounds

polarimeter is shown in Fig.3. In this polarimeter the protons are scattered at 45° at a solid carbon target 4 and enter a cylindrical proportional counter 8 and then the caesium iodide crystal 7. The latter crystal is in the form of a disc (32 mm diameter, 2 mm thick). The working gas in the proportional counters is argon. Pulses from the proportional and scintillation counters are fed into a coincidence circuit which again excludes neutron and gamma backgrounds. Whereas in the helium polarimeter the polarization due to the analyzer can be calculated (J.L. Gammel and R.M. Thaler, Ref.3), in the case of the carbon target a calibration is necessary. This is the major disadvantage of this instrument. However, the carbon polarimeter has a much better energy resolution and the polarization in p-Cl² elastic scattering has a large value at 45° , in wide energy interval. The polarimeters have been built for use in experiments on the He³ (d, p) He⁴ reaction. There are 3 figures and 5 references: 2 Soviet and 3 non-Soviet.

Card 3/6

3 Physics Tech Inst AS ~~USSR~~ USSR

VAL'TER, A.K.; ZALYUBOVSKIY, I.I. [Zaliubovs'kyi, I.I.];
KLYUCHAREV, V.A. [Kliuchariev, V.O.]; LUTSIK, V.A. [Lutsyk, V.P.]

Study of gamma-transitions in the $\text{Co}^{59}(\text{p}, \text{n}\gamma)\text{Ni}^{59}$. Ukr.
fiz. zhur. 6 no.3:318-332 My-Je '61. (MIRA 14:8)

1. Fiziko-tekhnicheskii institut AN USSR i Khar'kovskiy
gosudarstvennyy universitet im. Gor'kogo.

(Cobalt--Isotopes)

(Niobium--Isotopes)

(Nuclear reactions)

VAL'TER, A.K.; VATSET, P.I.; KOLESNIKOV, L.Ya.; TONAPETYAN, S.G.
[Tonapetian, S.H.]; CHERNYAVSKIY, K.K. [Cherniavs'kiy, K.K.];
SHPETNYY, A.I. [Sgpetnyi, O.I.]

Neutron yield in the reaction $\text{Be}^9(t, n)$. Ukr. fiz. zhur. 6
no.4:457-460 J1-Ag '61. (MIRA 14:9)

1. Fiziko-tekhnicheskii institut AN USSR, g. Khar'kov.
(Nuclear reactions) (Neutrons--Emission)

VALTER, A.K.; VATSET, P.I.; KOLESNIKOV, L. a.; TONAPETYAN, S.G.; CHERNYAVSKIY,
K.K.; SHPETNYI, A.I.

Neutron yield from Li^6 (t, n) and Li^7 (t, n) reactions. Atom.energ.
10 no.6:577-586 Je '61. (MIRA 14:6)
(Neutrons) (Lithium--Isotopes) (Nuclear reactions)

S/048/61/025/002/011/016
B117/B212

AUTHORS: Antuf'yev, Yu. P., Val'ter, A. K., Gonchar, V. Yu.,
Kopanets, Ye. G., L'vov, A. N., and Tsytko, S. P.

TITLE: Radiative proton capture by the S^{34} isotope

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, v. 25,
no. 2, 1961, 265-269

TEXT: The present paper was read at the 11th Annual Conference on Nuclear Spectroscopy (Riga, January 25 to February 2, 1961). The authors have investigated the radiative proton capture by S^{34} at a 1214-kev resonance energy. The gamma spectra were analyzed by means of a single-crystal spectrometer, a coincidence spectrometer, and a summation spectrometer. Based on the values obtained, the authors state that the transition of the 7.5-Mev resonance level proceeds only cascade-like over an intermediate level. The energies of the gamma rays in the cascade are 3.17 and 4.38 Mev. A direct transition to the ground state may have a relative intensity of less than 0.5%. The angular distribution of gamma rays was measured for rays with 4.38 Mev and 3.17 Mev at an angular interval of 0-150 degrees on both sides

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S/048/61/025/002/011/016
B117/B212

Radiative proton capture ...

of the proton beam. Test data and calculated data were intercompared. They were in best agreement when the spins of the resonance- and intermediate levels were equal to $7/2$. The value of the gamma-gamma correlation, measured with the summation spectrometer, corresponds (within the limit of error) to the calculated value, which fact confirms a spin of $7/2$. An analysis of the relative transition probability from the resonance level to the ground state and the intermediate state with a spin of $3/2^+$ and $7/2^+$, respectively, leads to the conclusion that the parity of the resonance and intermediate levels must be negative, and that the transition from the resonance level to the ground state must be $-M2$. The presence of one more level with the spin $7/2^-$ near 7.55 Mev, which corresponds to a resonance level, cannot be explained by single-body excitation on a shell- or generalized model. It may be assumed therefore that this level corresponds to a two-body excitation. A comparison of the values obtained experimentally for the width of the resonance level with those calculated according to a single-body model confirmed this assumption. The authors determined the absolute yield of gamma rays from a thick S^{34} target and found it to be $2.56 \cdot 10^{-9} \pm 15\%$ per each proton decay. The authors thank M. I. Guseva for preparing the isotopic targets, A. A. Tsygikalo, Yu. A. Kharchenko, and the personnel of the

Card 2/3

Radiative proton capture ...

S/048/61/025/002/011/016
B117/B212

electrostatic generator for the smooth operation of the latter. There are 5 figures and 5 references: 4 Soviet-bloc.

ASSOCIATION: Fiziko-tekhnicheskiy institut Akademii nauk USSR (Institute of Physics and Technology of the Academy of Sciences UkrSSR)

✓

Card 3/3

VAL'TER, A.K.; TSYTKO, S.P.; ANTUF'YEV, Yu.P.; KOPANETS, Ye.G.;
L'VOV, A.N.

Studying the levels of P^{31} by the aid of the $Si^{30}(p\gamma)P^{31}$
reaction. Izv. AN SSSR. Ser. fiz. 25 no.7:854-861 J1 '61.
(MIRA 14:7)

1. Fiziko-tekhnicheskiy institut AN USSR.
(Phosphorus—Isotopes) (Silicon—Isotopes)
(Nuclear reactions)

VAL'TER, A.K.; ZALYUBOVSKIY, I.I.; KLYUCHAREV, A.P.; LUTSIK, V.A.

Cu^{64} levels excited in the reaction $\text{Ni}^{64}(\text{p}, \text{n}\gamma) \text{Cu}^{64}$.

Izv. AN SSSR. Ser. fiz. 25 no.9:1127-1130 '61.

(MIRA 14:8)

1. Fiziko-tekhnicheskiy institut AN USSR.

(Niobium—Isotopes)

(Copper—Isotopes)

(Nuclear reactions)

VAL'TER, A.K.; VATSET, P.I.; KOLESNIKOV, L.Ya.; TONAPETYAN, S.G.;
CHERNYAVSKIY, K.K.; SHPITNYY, A.I.

Neutron yield in the reaction of tritons with fluorine and
aluminum nuclei. Zhur. eksp. i teor. fiz. 40 no.5:1237-1243
My '61. (MIRA 14:7)

1. Fiziko-tehnicheskii institut AN Ukrainskoy SSR.
(Nuclear reactions) (Tritons(Tritium ions)) (Neutrons—Measurement)

VAL'TER, A.K.; ZALYUBOVSKIY, I.I.; KLYUCHAREV, A.P.; LUTSIK, V.A.; ORLENKO,
B.F.; PASECHNIK, M.V.; PROKOPENKO, V.S.; PUCHEROV, N.N.

Angular distribution of 6.8 mev. protons elastically scattered on
nickel and zirconium isotopes. Zhur.eksp.i teor.fiz. 41 no.1:71-
74 J1 '61. (MIRA 14:7)

1. Institut fiziki AN Ukrainskoy SSR i Fiziko-tehnicheskii institut
AN Ukrainskoy SSR.
(Protons—Scattering) (Nickel—Isotopes) (Zirconium—Isotopes)

VAL'TER, A.K.; ANTUF'YEV, Yu.P.; KOPANETS, Ye.G.; L'VOV, A.N.;
TSYTKO, S.P.

Quantum characteristics of the 6.847 Me. level of P^{30} observed
in the reaction $Si^{29}(p,\gamma)P^{30}$. Zhur. eksp. i teor. fiz. 41
no.5:1449-1453 N '61. (MIRA 14:12)

1. Fiziko-tehnicheskiiy institut AN Ukrainskoy SSR.
(Nuclear reactions) (Phosphorus)
(Silicon—Isotopes)

VAL'TER, Anton Karlovich; FLAKSIN, Igor' Nikolayevich; GOL'DIN, Mikhail
I.'vovich; SAVITSKIY, P.S., inzh., otv. red.; KORILOVA, T.M., red.;
TROFIMENKO, A.S., tekhn. red.

[Automatic density control of iron-ore flotation pulps with the
help of gamma rays] Avtomaticheskii kontrol' plotnosti zhelezo-
rudnoi pul'py gamma-luchami. Khar'kov, Izd-vo Khar'kovskogo
univ., 1962. 243 p. (MIRA 16:6)
(Flotation) (Gamma rays--Industrial applications)

5/903/62/000/000/017/044
B002/B234

AUTHORS: Val'tor, A. K., Vanotsian, A. A., Klyucharev, A. P.,
Timoshevskiy, G. E., Fedchenko, Ye. D.

TITLE: Calculation of the differential elastic scattering cross
sections of 6.8-Mev protons for nuclei of some Ni, Cu, and Cr
isotopes on the basis of the optical model of the nucleus

SOURCE: Yadernyye reaktsii pri mal'nykh i srednikh energiyakh; trudy
Vtoroy Vsesoyuznoy konferentsii, 1960. g. Ed. by
A. A. Val'tor, A. A. Vanotsian, A. P. Klyucharev, G. E. Timoshevskiy, Ye. D. Fedchenko. Moscow, 1961. 100 p.

Text: To obtain information on the energy dependence of the parameters and on the
differential scattering of protons on the basis of these parameters in the
case of agreement with experiment, optical-model calculations were carried
out for Cr^{53,58}, Ni^{60,62}, and Cu^{63,65} for $E_p = 5.45, 6.8$ and 19.6 Mev, which
gives the possibility of obtaining the energy dependence of the parameters.
The material data needed were taken from the literature. The calculations
were carried out on the BESM-6 computer. The calculations

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Calculation of the differential...

S/903/62/000/000/017/044
B102/B234

are made in the usual manner with the potential ansatz

$$V^{\pm}(r) = V_{\text{coul}}(r) + V_0 \frac{1}{1 + e^{\frac{r-r_0}{ka}}} + iW_0 e^{-\left(\frac{r-r_0}{kb}\right)^2} - \chi \left(\frac{\hbar}{\mu c}\right)^2 \frac{1}{r} \frac{d}{dr} V_{\infty}(sl). \quad (8)$$

$$(sl) = \begin{cases} l & \text{для } j = l + \frac{1}{2}, \\ -(l+1) & \text{для } j = l - \frac{1}{2}, \\ 0 & \text{для } l = 0. \end{cases}$$

where $V_{\text{coul}}(r)$ is the Coulomb potential. Agreement was best when the following parameters were used:

	r_0	a	b	V_0	W_0	V_{∞}
Cu ⁶³	1,23	0,38	0,80	64,7	7,6	92
Ni ⁶⁰	1,23	0,36	0,73	66,3	6,6	94
Ni ⁶³	1,23	0,37	0,74	66,0	6,5	93
Ni ⁶⁴	1,23	0,46	0,34	64,0	5,6	53
Cu ⁶⁴	1,23	0,43	0,85	64,2	5,1	60

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S/9.3/62/000/000/017/044
B102/B234

Calculation of the differential...

Conclusions: The position of the extrema in the $\sigma(\theta)$ curve is mainly determined by the two parameters V_0 and r_0 which are interrelated by $V_0 r_0^2 = \text{const.}$ Any change of these parameters affects not only the position but also the amplitude of the extremum. When V_0 and r_0 are increased the extremum becomes shifted to smaller angles θ . A variation of a corresponds to rotation of the angular distribution around $\theta = 0^\circ$; increasing of a means rotation in the negative sense. Reduction of b shifts the extrema toward larger θ and raises their amplitude, particularly at large θ . W influences only the height of the extrema. Any alteration of the spin-orbital potential V_s causes a distortion of the angular distribution especially for $\theta > 120^\circ$. There are 11 figures and 1 table.

ASSOCIATION: Fiziko-tehnicheskiy institut AN USSR (Physicotechnical Institute AS USSR)

Card 3/3


S/185/62/007/004/008/018
D407/D301

AUTHORS: Skakun, M. O., Val'ter, A. K., and
Klyucharyev, O. P

TITLE: Proton polarization in $D(d,p)H^3$ -reaction

PERIODICAL: Ukrayins'kyy fizychnyy zhurnal, v. 7, no. 4,
1962, 383-385

TEXT: Proton polarization in the $D(d,p)H^3$ -reaction was determined by measuring the asymmetry of elastically scattered protons by helium. The protons were recorded by means of a telescope incorporating a proportional counter and a photo-multiplier. In the present work, a method is used whereby the background is considerably reduced. This method involves application of a paraffin coating 25 cm thick. The experimental procedure is described. The degree of polarization P_1 for particles with spin $1/2$ was determined by measuring the azimuthal asymmetry R of elastically scattered protons, by means of the



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S/185/62/007/004/008/018
D407/D301

Proton polarization in...

formula

$$R = \frac{1 + P_1 P_{an}}{1 - P_1 P_{an}},$$

where P_{an} is determined by the geometry of the analyzer. The angle of elastic scattering was 90° , and $P_{an} = 0.39$. The results of the measurements are listed in a table. With energies of 0.72, 1.10, and 1.48 Mev, the degree of polarization was found to be $-17 \pm 8\%$, $-18 \pm 9\%$, and $-15 \pm 9\%$ respectively.

A comparison with the results of other investigators showed good agreement. There are 1 figure, 2 tables and 11 references: 3 Soviet-bloc and 8 non-Soviet-bloc. The 4 most recent references to the English-language publications read as follows: McCormac, Steuer and Hereford, Phys. Rev., 104, 718, 1956; B. Maglic, Nuclear Physics, 6, 449, 1958; R. Segel and S. Hanna, Phys. Rev.,

Card 2/3

Proton polarization in...

S/185/62/007/004/008/018
D407/D301

106, 536, 1957; W. Dachnick, Phys. Rev., 115, 1008, 1959.

ASSOCIATIONS: Fizyko-tekhnichnyy instytut AN URSR (Physico-
technical Institute of the AS UkrSSR);
Kharkovs'ky derzhuniversytet im. A. M. Gor'kogo
(Kharkiv State University im. A. M. Gor'kiy)

SUBMITTED: September 23, 1961

Card 3/3

24.6600

40104
S/048/62/026/008/020/028
B104/B102

AUTHORS: Val'ter, A. K., Gonchar, V. Yu., Zalyubovskiy, I. I.,
Latyshev, G. D., and Chursin, G. P.

TITLE: Study of the (np) and (n,np) reactions on heavy nickel
isotopes

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya,
v. 26, no. 8, 1962, 1079-1084

TEXT: The object of this study was to find possibilities for further investigations of spectra and angular distributions of the products of (np) and (n,np) reactions on nickel, and to check the rules governing the reaction cross sections as found by V. N. Levkovskiy (ZhETF, 31, 360, 1956; 33, 1520, 1957). A tritium target (T being adsorbed to zirconium) was bombarded by 100-kev deuterons and sufficiently fast neutrons were produced in the $T(d,n)He^3$ reaction. A recoil proton telescope was used as neutron monitor and the β -activity induced was measured with a scintillation counter. The half-lives were determined by a multi-channel analyzer. The reaction cross sections obtained (Table) agree with pub-

Card 1/2

Study of the (np) and (n,np) ...

S/048/62/026/008/020/028
B104/B102

lished data within the limits of error. The rule found by Levkovskiy for the (np) reaction cross sections of various isotopes of an element applies very well to Ni. There are 5 figures and 1 table. ✓

ASSOCIATION: Khar'kovskiy gos. universitet im. A. M. Gor'kogo (Khar'kov State University imeni A. M. Gor'kiy). Institut yadernoy fiziki Akademii nauk KazSSR (Institute of Nuclear Physics of the Academy of Sciences KazSSR)

Table. Cross sections. Legend: (1) reaction, (2) half-life, (3) Q, Mev, (4) σ , millibarn.

Ni ⁶¹ (np) Co ⁶¹	(1)	104±2	(2)	-0,65	(3)	86±3	(4)
Ni ⁶² (np) Co ⁶²		13,9±0,2		-3,14		22±1	
Ni ⁶³ (np) Co ⁶³		1,5±0,1		-		34±2	
Ni ⁶⁴ (np) Co ⁶⁴		9,3±0,9		-5,08		5±1	
Ni ⁶⁴ (np) Co ⁶⁴		2±0,2		-		2±1	
Ni ⁶³ (n, np) Co ⁶¹		104±2		-9,70		4±1,5	
Ni ⁶⁴ (n, np) Co ⁶³		122±5		-10,86		6±1,5	

Card 2/2

S/048/62/026/009/003/011
E125/B186

AUTHORS: Val'ter, A. K., Antuf'yev, Yu. P., Kopanets, Ye. G., L'vov, A. N., and Tsytko, S. P.

TITLE: Decay scheme of the 8.92-Mev state and quantum characteristics of the lower levels of the K^{41} nucleus

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya, v. 26, no. 9, 1962, 1137-1142

TEXT: In continuation of an earlier paper by A. K. Val'ter et al. (Izv. AN SSSR, Ser. fiz., 24, no. 7, 891 (1960) on the reaction $\text{Ar}^{40}(\text{p})$ the 1107.5 kev resonance is studied. The proton beam from the electrostatic generator of the FTI AN USSR was made to strike the target through a collimating system. Ar^{40} ions were "knocked" into the tantalum backing of such targets. Fig. 1 shows the hard part of the spectrum taken by a β -spectrometer with an NaI(Tl) crystal. The peaks R, A, B, C, and D of the soft part are at 0.5; 0.6; 1.0; 1.3, and 1.6 Mev. The spectrum of Fig. 3 was taken by a coincidence spectrometer with two crystals. The
Card 1/6

S/O48/62/026/009/003/011

B125/B186

Decay scheme of the 8.92-Mev ...

lines A, B, C, D coincide with the hard part of the spectrum. The anisotropy $A = (W(90^\circ) - W(0^\circ)) / W(90^\circ)$ of the angular distribution of the γ -rays at 7.9; 7.3; 6.3; 1.6 and 1.0 Mev is 0.48; -0.54; +0.14 and +0.05, respectively. There is no transition between the 8.92-Mev resonance level and the ground state. Most of the transitions coming from the resonance level have the same probability. The 2.6-Mev state passes to the ground state rather indirectly over the 1.0-Mev level or over the 1.6-Mev level. The line intensity ratio $I_D/I_A \approx 1$ remains almost constant from $E_\gamma = 6.0$ to $E_\gamma = 6.8$. Then it decreases rapidly to ~ 0.22 with $E_\gamma \sim 6.8$ and ~ 0.18 with $E_\gamma \sim 7.6$ Mev. The levels with 1.0 and 1.3; 1.6 and 2.6 Mev are formed according to the scheme of Nillson S. P., Danske Mat. fys. medd., 29, No 16 (1955) by single-particle excitation when an unpaired proton passes onto states with $1/2^-$, $7/2^-$, $3/2^-$ and $5/2^-$. The 8.92-Mev resonance level occurs when a proton in the state $g_{7/2}$ with $\Omega = 3/2^+$ is captured. For the levels 1.0; 1.6; 6 and 8.82 Mev the spins and parities $1/2^-$, $3/2^-$, $5/2^-$, and $3/2^-$ are the most probable. These values are also compatible with the shell model having a strong jj-coupling. There are 6 figures and 2 tables.

Card 2/6

Decay scheme of the 8.92-Mev ...

S/048/62/026/009/003/011
B125/B186

ASSOCIATION: Fiziko-tekhnicheskiy institut Akademii nauk USSR
(Physicotechnical Institute of the Academy of Sciences
UkrSSR)

Fig. 1. γ -ray spectrum studied with a "single-crystal" spectrometer
(hard part).

Fig. 3. γ -ray spectrum studied with the aid of a "summing" spectrometer.

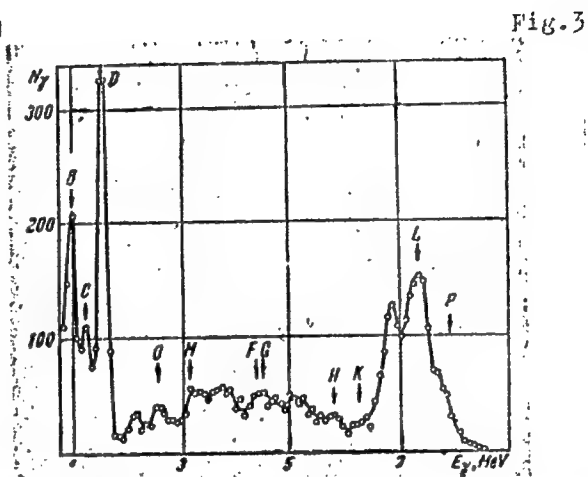
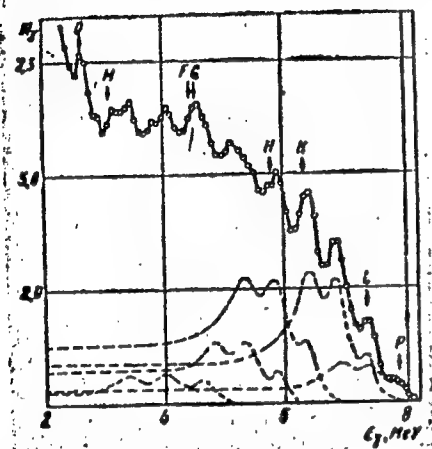
Fig. 5. Scheme of the levels of the K^{41} nucleus

Table 2. Possible values of the level spins.

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Decay scheme of the 8.92-Mev ...

S/048/62/026/009/003/011
B125/B186



Card 4/6

Decay scheme of the 8.92-Mev ...

S/048/62/026/009/003/011
B125/B186

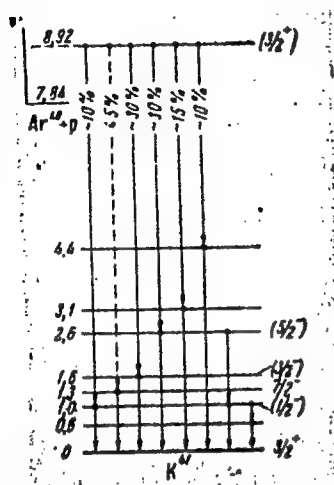


Fig. 5

Card 5/6

Decay scheme of the 8.92-Mev ...

S/048/62/026/009/003/011
B125/B186

Table 2

$I_{\text{pec}} = 1/2$							$I_{\text{pec}} = 3/2$						
E^* MeV	I		$\delta = \frac{I_{L=2}}{I_{L=1}}$				E^* MeV	I		$\delta = \frac{I_{L=2}}{I_{L=1}}$			
1,0	$1/2$	—	$1/2$	0,03	—	0	1,0	$3/2$	—	$1/2$	0,04	—	0
1,6	—	$3/2$	—	—	0,01	—	1,6	—	$3/2$	—	—	0,03	0,1
2,0	$1/2$	—	$3/2$	0	—	0,00	2,0	$3/2$	—	$1/2$	0	—	0,03

Card 6/6

S/056/62/042/002/013/055
B102/B138

AUTHORS: Antuf'yev, Yu. P., Val'ter, A. K., L'vov, A. N., Kopanets, Ye. G., Tsytko, S. P.
TITLE: Investigation of the resonances in the reaction $\text{Si}^{29}(\text{p}, \gamma)\text{P}^{30}$
PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 42, no. 2, 1962, 386-391

TEXT: The relative gamma quantum yield of the reaction $\text{Si}^{29}(\text{p}, \gamma)\text{P}^{30}$ was measured in the range $1.3 \leq E_p \leq 1.55$ Mev. Of the five resonances detected, those at $E_p = 1375$ and 1500 kev were studied in detail; the others were at 1308 , 1330 , and 1470 kev. For the 1375 -kev resonance, related to the 6.892 -Mev level of the P^{30} nucleus and the 1500 -kev resonance (7.014 -Mev level), the spectra and the gamma-quantum angular distributions were determined. The parameters of the gamma lines of these spectra were determined numerically and the decay schemes (Figs. 5, 6) are given. For the most intense line (6.20 Mev) of the 1375 -kev resonance spectrum the angular asymmetry of the angular distribution $W = 1 + A \cos^2 \theta$ (dipole

Card 1/3

Investigation of the resonances ...

S/056/62/042/002/013/055
B102/B138

γ -transition) was measured as $A = [W(0^\circ) - W(90^\circ)]/W(90^\circ) = -0.63 \pm 0.05$. The corresponding value, $A = 1.07 \pm 0.10$ was measured for the most intense gamma line (2.83 keV) of the 1500-keV resonance spectrum. The values of the level parameters J^π and T are discussed. There are 6 figures, 3 tables, and 5 references: 3 Soviet and 2 non-Soviet. The two references to English-language publications read as follows: P. M. Endt et al. Phys. Rev. 95, 580, 1954; C. Van der Leun, P. M. Endt. Phys. Rev. 110, 89, 1958.

ASSOCIATION: Fiziko-tekhnicheskiy institut Akademii nauk Ukrainskoy SSR
(Physicotechnical Institute of the Academy of Sciences
Ukrainskaya SSR)

SUBMITTED: August 17, 1961

Figs. 5 and 6. Decay schemes and gamma transitions from the resonance levels 6.892 and 7.014 keV, respectively.

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B102/B104

24,660

AUTHORS: Val'ter, A. K., Popov, A. I., Storizhko, V. Ye.

TITLE: Elastic scattering of protons from Si^{30} nuclei

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 43,
no. 6(12), 1962, 2038 - 2041

TEXT: The differential elastic proton scattering cross-sections $\sigma(\theta)$ were measured at the c.m. angles $\theta = 90, 125, \text{ and } 141^\circ$ and at $1 \leq E_p \leq 3.65$ Mev.

The monochromatic ($\pm 0.05\%$) protons used in the experiments were obtained from the electrostatic accelerator of the FTI AN USSR. The scattered protons were analyzed by a magnetic spectrometer and detected with a thin CsI(Tl) crystal. The proton current was determined with a beam-catcher and a current integrator. The thin Si^{30} target was prepared in a magnetic separator by introducing Si^{30} ions into spectrally pure graphite. In the energy range investigated, the $\sigma(E_p)$ curves showed 52 resonances that can be related to excited states of the P^{31} nucleus. The most pronounced

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resonances are analyzed in the single-level approximation of dispersion theory. Results: The excited 8.751-Mev level of P^{31} that corresponds to the resonance at $E_p = 1514$ kev most probably has the characteristics $l = 0$, $J = 1/2^+$. The resonance at $E_p = 3202$ kev corresponds to the 10.385 Mev level with $l = 2$ and most probably $J = 5/2^+$. The resonance at $E_p = 3308$ kev corresponds to the 10.487 Mev level with the characteristics $1/2^+$. This resonance is due to a proton capture in the S-state. The resonance at $E_p = 3438$ kev corresponds to the 10.614 Mev level with $l = 2$ and $J = 3/2^+$. The cross-sections of the $Si^{30}(p,p)Si^{30}$ reactions decrease with increasing E_p ; this decrease is most pronounced at $\theta = 90^\circ$ and least at 141° . There are 4 figures and 1 table.

ASSOCIATION: Fiziko-tekhnicheskiy institut Akademii nauk Ukrainskoy SSR
(Physicotechnical Institute of the Academy of Sciences
Ukrainskaya SSR); Khar'kovskiy gosudarstvennyy universitet
(Khar'kov State University)

SUBMITTED: July 11, 1962
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B104/B180

AUTHORS:

Val'ter, A. K., Academician AS UkrSSR, Klyucharev, A. P.,
Lutsik, V. A., Orlenko, B. F., Pasechnik, M. V., Academician
AS UkrSSR, Prokopenko, V. S., Pucherov, N. N.

TITLE:

The elastic scattering of 6.9 Mev protons by chromium and
zinc isotopes

PERIODICAL:

Akademiya nauk SSSR. Doklady, 147, no. 6, 1962, 1325-1327

TEXT: A method described by A. K. Val'ter et al. (ZhETF, 38, 1419
(1960)) was used to investigate the elastic scattering of (6.9 ± 0.07)
Mev protons by Cr^{50} , Cr^{54} , Cr^{52} , Cr^{53} , Zn^{64} , Zn^{68} , Zn^{70} . Between 20 and
160°, the angular distribution of the elastically scattered protons was
determined in the form of the angular dependence of $\sigma_{\text{exp}}/\sigma_{\text{Rutherford}}$
every 5°. For chromium the results obtained (Fig. 1) show that the
(p,n) reaction definitely makes a partial contribution to the proton
scattering by Cr^{52} (reaction threshold 5.63 Mev) and a strong contribution
when the protons are scattered by Cr^{53} and Cr^{54} ((p,n) reaction thresholds
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The elastic scattering of α -particles

5.45 Mev). The (p,n) reaction threshold of the zinc isotopes is 8 Mev, but the angular distributions of the proton scattering are similar to those in heavy chromium isotopes. This abnormal angular distribution might be solved by investigating the system $Zn^{64} + p$ in a wide energy range and studying the elastic scattering and possible nuclear reactions. There are 1 figure and 1 table. ✓

ASSOCIATION:

Institut fiziki Akademii nauk USSR (Institute of Physics of the Academy of Sciences UkrSSR); Fiziko-tehnicheskiy institut Akademii nauk USSR (Physicotechnical Institute of the Academy of Sciences UkrSSR)

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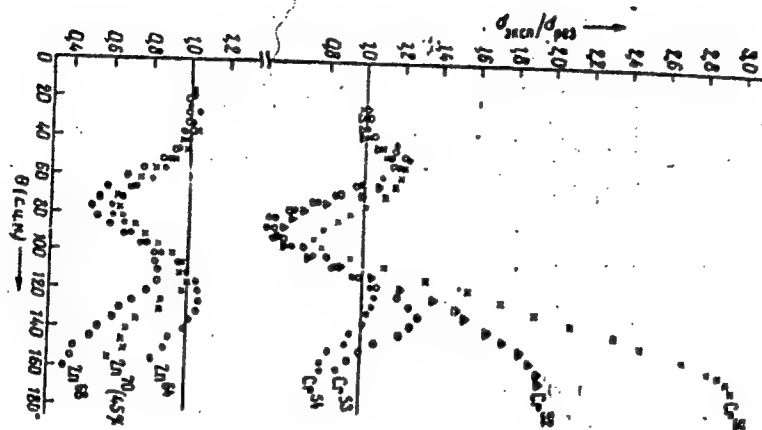
June 21, 1962

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The elastic scattering of ...

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Fig. 1



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PHASE I BOOK EXPLOITATION

SOV/6536

Val'ter, A. K., F. G. Zheleznikov, I. F. Malyshev, G. Ya. Roshal',
A. N. Serbinov, A. A. Tsygikalo, and S. P. Tsytko

Elektrostaticheskiye uskoriteli zaryazhennykh chastits (Electrostatic
Accelerators of Charged Particles) Moscow, Gosatomizdat, 1963.
301 p. 4700 copies printed.

Ed. (Title page): A. K. Val'ter, Academician, Academy of Sciences of
the UkrSSR.

Ed.: A. V. Gorokhovskiy; Tech. Ed.: N. A. Vlasova.

PURPOSE: This book is intended for scientists, students, engineers,
and technicians developing, utilizing, or studying high-potential
engineering and acceleration of charged particles.

COVERAGE: This textbook on electrostatic generators is devoted chiefly
to electrostatic accelerators intended for nuclear research.

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Electrostatic Accelerators (Cont.)

Sections 1—3 of Ch. I are written by A. K. Val'ter; Section 4 of Ch. I and Chs. II, V, and VII are written by A. A. Tsygikalo; Ch. III, by A. N. Serbinov; Ch. IV, by S. P. Tsytko; and Ch. VI, by I. F. Malyshev, F. G. Zheleznikov, and G. Ya. Roshal'. There are 182 references: 73 Soviet and 109 non-Soviet.

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